

CLAIM AMENDMENTS

This listing of claims will replace all prior versions and listings of claims in the application.

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2 1. (Currently Amended) A method of characterizing a content traffic flow at
3 communication nodes of a communications network for communications network
4 Service Level Agreement (SLA) compliance assessment by a ~~central-entity- network~~
5 management system (NMS) connected to said communication nodes, the method
6 comprising:

7 at least one of said communication nodes tracking cumulative content
8 arrivals, in real time, for the content traffic flow to derive a time variation of
9 cumulative content arrivals;

10 said at least one of said nodes adjusting characteristic arrival curve
11 parameters, the arrival curve parameters comprising at least ~~a slope and an~~
12 ordinate intercept b, a degree of burst transmission, r, a sustainable content
13 conveyance rate, M, a maximum packet size, and p, a peak content conveyance rate,
14 in fitting an arrival curve to the variation of cumulative content arrivals for the
15 content traffic flow; and

16 said at least one of said nodes reporting said adjusted arrival curve
parameters to said ~~central-entity- NMS~~ to enable said ~~central-entity- NMS~~ to carry

17 out said SLA compliance assessment with respect to the content traffic flow,
18 thereby reducing reporting bandwidth overhead by minimizing an amount of
19 content arrival information communicated to said ~~central entity~~ NMS.

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2 2. (Currently Amended) The method of providing a content traffic flow
3 characterization as claimed in claim 1, wherein reporting arrival curve parameters
4 to the ~~central entity~~ NMS is carried out in real time, and reporting is limited to
arrival curve parameters only.

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2 3. (Previously Presented) The method claimed in claim 1, further comprising:
3 said at least one of said nodes including a timestamp specifying the time of
the arrival curve fit.

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2 4. (Currently Amended) The method claimed in claim 1, further comprising:
3 said at least one of said nodes receiving a request for an arrival curve
parameter update;
4 reporting arrival curve parameters to the ~~central entity~~ NMS only in
5 response to a request; and
6 further providing a reduction in the reporting bandwidth overhead.

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2 5. (Previously Presented) The method claimed in claim 1, further comprising:

2 said at least one of said nodes tracking one of cumulative received packets,
3 bits, bytes, words, and double words.

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1 6-7. (Canceled).

1 8. (Previously Presented) The method claimed in claim 1, further comprising:

2 said at least one of said nodes fitting the arrival curve in accordance with one
3 of a shifted linear regression procedure, and a convex hull fitting procedure.

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1 9-11. (Canceled).

1 12. (Currently Amended) A method of assessing communications network
2 conformance to a Service Level Agreement (SLA) in respect of a content traffic flow
3 at communication nodes of a communications network, the method comprising:

4 receiving from at least one of said communication nodes an arrival curve
5 parameter report in respect of a tracked content traffic flow in real time;

6 computing a resource utilization related value based on the received arrival
7 curve parameter report in respect of a content traffic flow pattern and at least one
8 service curve; and

9 providing a communications network SLA conformance assessment to a
10 network management system (NMS) based on the computed resource utilization

related value, wherein receiving arrival curve parameters, the arrival curve parameters comprising at least b, a degree of burst transmission, r, a sustainable content conveyance rate, M, a maximum packet size, and p, a peak content conveyance rate ~~a slope and an ordinate intercept~~, only enables the provision of a real-time scalable communications network SLA conformance assessment solution while reducing reporting bandwidth overhead by minimizing an amount of content arrival information communicated by said at least one of said nodes.

13. (Currently Amended) The method claimed in claim 12, further comprising:

~~a central entity the NMS~~ requesting an arrival curve parameter report from said one of said nodes.

14. (Previously Presented) The method claimed in claim 12, further comprising:

retrieving the at least one service curve from storage in respect of the content traffic flow.

15. (Previously Presented) The method claimed in claim 12, further comprising:

retrieving the at least one service curve from said at least one node, said at least one node being in a path of the content traffic flow.

16. (Previously Presented) The method claimed in claim 12, further comprising:

2 retrieving from storage a sequence in which multiple service curves are to be
3 combined with the arrival curve parameters in respect of the content traffic flow.

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1 17. (Previously Presented) The method claimed in claim 12, further comprising:
2 discovering a sequence in which multiple service curves are to be combined
3 with the arrival curve parameters in respect of the content traffic flow.

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1 18. (Previously Presented) The method claimed in claim 12, further comprising:
2 computing Quality-of-Service (QoS) parameters.

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1 19. (Previously Presented) The method claimed in claim 12, further comprising:
2 convolving an arrival curve respecting the received arrival curve parameters
3 with a service curve.

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1 20. (Previously Presented) The method claimed in claim 12, further comprising:
2 comparing the computed resource utilization related value with a
3 corresponding agreed upon resource utilization value.

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1 21. (Previously Presented) The method claimed in claim 12, further comprising:

2 selectively modifying communications network operational parameters to
3 ensure that the resource utilization values comply with agreed upon SLA resource
4 utilization values.

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1 22. (Previously Presented) The method claimed in claim 12, further comprising:
2 selectively modifying SLA specified resource utilization values to ensure that
3 the current communications network operation is accommodated in the SLA.

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1 23. (Previously Presented) The method claimed in claim 12, further comprising:
2 providing a proposal for traffic content redirection onto one of existing
3 infrastructure and new to be deployed infrastructure.

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1 24. (Canceled)

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1 25. (Currently Amended) A method of centrally assessing communications
2 network conformance to a Service Level Agreement (SLA) in respect of a content
3 traffic flow at least one of a plurality of communication nodes of a communications
4 network, the method comprising:

5 said at least one communication node tracking cumulative content arrivals
6 for the content traffic flow, in real-time, to derive a time variation of cumulative
7 content arrivals at a communications network node;

8 said at least one of said nodes adjusting arrival curve parameters, the arrival
9 curve parameters comprising at least b, a degree of burst transmission, r, a
10 sustainable content conveyance rate, M, a maximum packet size, and p, a peak
11 content conveyance rate, a slope and an ordinate intercept in fitting an arrival
12 curve to the variation of cumulative content arrivals for the content traffic flow;

13 said at least one node reporting, in real time, the arrival curve parameters to
14 a central entity network management system (NMS) assessing communications
15 network SLA conformance with respect to the content traffic flow;

16 said ~~central entity NMS~~ receiving an arrival curve parameter report in
17 respect of a tracked content traffic flow from said at least one network node in real-
18 time;

19 computing a resource utilization related value based on the received arrival
20 curve parameter report in respect of a content traffic flow pattern and at least one
21 service curve; and

22 providing a communications network SLA conformance assessment based on
23 the computed resource utilization related value[.]; and

24 employing arrival curve parameter reporting ~~greatly~~ reducing resource
25 overheads in providing communications network SLA conformance assessments.

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26. (Previously Presented) The method claimed in claim 25, further comprising:

2 said at least one of said nodes including a timestamp specifying the time of
3 the arrival curve fit.

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1 27. (Currently Amended) The method claimed in claim 26, further comprising:

2 said at least one of said nodes receiving a request for an arrival curve
3 parameter update;

4 | reporting arrival curve parameters to the ~~central entity~~ NMS only in
5 response to a request; and

6 further providing a reduction in the reporting bandwidth overhead.

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1 28. (Previously Presented) The method claimed in claim 25, further comprising:

2 said at least one of said nodes tracking one of cumulative received packets,
3 bits, bytes, words, and double words.

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1 29-30. (Canceled)

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1 31. (Previously Presented) The method claimed in claim 25, further comprising:

2 said at least one of said nodes fitting the arrival curve in accordance with one
3 of a shifted linear regression procedure, and a convex hull fitting procedure.

1 32. (Previously Presented) The method claimed in claim 25, further comprising:
2 requesting an arrival curve parameter report from said at least one of said
3 nodes.

1 33. (Previously Presented) The method claimed in claim 25, further comprising:
2 retrieving the at least one service curve from storage in respect of the content
3 traffic flow.

1 34. (Previously Presented) The method claimed in claim 25, further comprising:
2 retrieving the at least one service curve from said at least one node, said at
3 least one node being in a path of the content traffic flow.

1 35. (Previously Presented) The method claimed in claim 25, further comprising:
2 retrieving from storage a sequence in which multiple service curves are to be
3 combined with the arrival curve parameters in respect of the content traffic flow.

1 36. (Previously Presented) The method claimed in claim 25, further comprising:
2 discovering a sequence in which multiple service curves are to be combined
3 with the arrival curve parameters in respect of the content traffic flow.

1 37. (Previously Presented) The method claimed in claim 25, further comprising:
2 computing Quality-of-Service (QoS) parameters.
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1 38. (Previously Presented) The method claimed in claim 25, further comprising:
2 convolving an arrival curve respecting the received arrival curve parameters
3 with a service curve.
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1 39. (Previously Presented) The method claimed in claim 25, further comprising:
2 comparing the computed resource utilization related value with a
3 corresponding agreed upon resource utilization value.
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1 40. (Previously Presented) The method claimed in claim 25, further comprising:
2 selectively modifying communications network operational parameters to
3 ensure that the resource utilization values comply with agreed upon SLA resource
4 utilization values.
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1 41. (Previously Presented) The method claimed in claim 25, further comprising:
2 selectively modifying SLA specified resource utilization values to ensure that
3 the current communications network operation is accommodated in the SLA.
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1 42. (Previously Presented) The method claimed in claim 25, further comprising:
2 providing a proposal for traffic content redirection onto one of existing
3 infrastructure and new to be deployed infrastructure.

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1 43. (Canceled).

1 44. (Previously Presented) The method as claimed in claim 1, wherein said
2 tracking, adjusting, and reporting are carried out by more than one of said
3 communication nodes.

1 45. (Previously Presented) The method as claimed in claim 12, wherein said
2 arrival curve parameter report is received from more than one of said
3 communication nodes.

1 46. (Previously Presented) The method as claimed in claim 25, wherein said
2 tracking, adjusting, and reporting are carried out by more than one of said
3 communication nodes, and said arrival curve parameter report is received from
4 more than one of said communication nodes.